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Regularization by the integral identities method for integral and series equations in diffraction problems

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Abstract

© 2000 IEEE. A method of integral identities for the regularization of some problems of the diffraction theory of the electromagnetic waves is proposed. Two auxiliary overdetermined Cauchy problems for the Helmholtz equation for a half-plane and for a half-strip are considered. It is shown that the Fourier transforms of the boundary functions must satisfy some condition. The special integral identities can be obtained from this condition. In the periodical case the integral identities have a summatorial identities form. Two particular problems are studied: the plane electromagnetic wave diffraction on a periodic metallic grating and the problem of diffraction on a step in the plane waveguide with metallic walls. It is shown that these problems are equivalent to infinite systems of linear algebraic equations of the second kind.

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Keywords

Boundary conditions, Diffraction gratings, Electromagnetic diffraction, Electromagnetic scattering, Electromagnetic waveguides, Fourier transforms, H infinity control, Integral equations, Planar waveguides, Waveguide components